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the Eocene Green River shales of Wyoming. Most of the fossil gar pikes of America have been hitherto known from bare fragments scantily described. Mr. Eastman's specimen of *L. atrox* is especially complete, as large as an alligator gar, and very much like it in appearance. In fact it "lacks any positively archaic features," and Mr. Eastman regards it as "obviously the direct progenitor of the alligator gar, *L. tristychus*." Mr. Eastman finds no trace of the earlier ancestry of *Lepidosteus*. The gar pikes "blossom forth suddenly and fully differentiated at the dawn of the Tertiary without the least clue to their ancestry, unheralded and unaccompanied by any intermediate forms, and they have remained essentially unchanged ever since."

In the *Bulletin* of the Kansas University, Vol. I, No. 2, Prof. S. W. Williston describes and figures many teeth of sharks found in the Cretaceous rocks of Kansas, his paper being a very useful contribution to this difficult branch of paleontology. In the matter of nomenclature, apparently, Agassiz's name, *Oxyrhina*, should not be used instead of the earlier *Isurus* of Rafinesque, and *Scylliorhinus* of Blainville has unfortunately clear priority over *Scyllium* Cuvier.

PETROGRAPHY.

Geology of the Black Hills.—Irving's contribution to the geology of the Northern Black Hills adds a great deal to our knowledge of this interesting region, especially from the point of view of petrography. The author agrees with Crosby, rather than with Russell, in regarding the larger intrusives of the district as laccolites and not as plugs. He finds also an abundance of sills and dikes. The dikes characterize the Algonkian slates, the sheets and laccolites the Cambrian shales. The Carboniferous limestone is almost devoid of intrusions of any kind. The principal types of rocks recognized are a quartz-ægirite-porphyry, tinguaitite, phonolite, trachytoid-phonolite, quartz-porphyry, mica-diorite-porphyry, dacite, tonalite, and augite-vogesite. The phonolites and quartz-porphyries are the most abundant types, with the quartz-ægirite-porphyries and the diorite-porphyries fairly abundant. There is such an intimate gradation between the different types that they appear to be related genetically. In the pre-Cambrian rocks, dikes and possibly plutonic

intrusions of basic igneous magmas took place before the metamorphism of the Algonkian sediments.

The author does not agree with Van Hise in ascribing the crystalline character of the schists near Deadwood to the agency of intrusives. He regards the metamorphism as "dynamic" rather than "contact."¹

Isle Royale and Keweenaw Point Volcanics.—In Vol. VI of the Michigan Survey, Lane² and Hubbard³ give a great many interesting details concerning the petrography of the Keweenaw eruptives.

One of the most interesting features of Lane's paper is his discussion of the cause of the variation in coarseness of grain in rocks, and the application of his conclusions to the problem of the nature of the Isle Royale and other rock-sheets. From the fact that the Isle Royale sheets are characterized by an increase in the size of grain to their centers, he concludes that they are surface flows or lavas. On the other hand, he concludes that Lawson's view as to the intrusive character of the diabase sheets in the Huronian beds of the north shore of Lake Superior is confirmed by the fact that they are characterized by a rapid variation in size of grain for the first few feet from their contacts with the surrounding rocks, and then by a central coarser belt of tolerably uniform grain.

Another interesting chapter in the report is that on the differences in structure between small intrusive basic masses and their corresponding effusive forms. To the already recognized distinctions between these two forms of igneous rocks, Lane adds that the miarolitic cavities in intrusive masses naturally become filled with other minerals than the zeolitic and chloritic ones characterizing the corresponding pores in effusive rocks. Among the most important of these minerals is quartz, which often appears in diabase dikes as micropegmatitic intergrowths in the central portions of their masses. The microscopic and chemical features of the Isle Royale lavas are described in some detail.

The report by Hubbard deals mainly with the structural problems presented by the interbedded lavas and sandstones in Keweenaw Point. It contains a few notes in the petrography of the various lava beds.

¹ *Ann. New York Acad. Sci.*, vol. xii, p. 187.

² Lane, A. C. Geological Report on *Isle Royale, Michigan*. *Geol. Survey of Michigan*, vol. vi, pt. i.

³ Hubbard, L. L. Keweenaw Point, with Particular Reference to the Felsites and their Associated Rocks, *ibid.*, vol. vi, pt. ii.